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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/734,018	12/11/2003	Da Yu Wang	DP-309420	8630

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EXAMINER	
NOGUEROLA, ALEXANDER STEPHAN	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 08/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/734,018	WANG ET AL.	
	Examiner	Art Unit	
	ALEX NOGUEROLA	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10 and 16* is/are rejected.

7)☒ Claim(s) *11-15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Haefele et al. (US 4,985,126) ("Haefele").

Addressing claim 1, Haefele discloses an ammonia gas sensor (abstract and claims 7 and 9), comprising

a reference electrode (13);

an ammonia selective sensing electrode (7); and

an electrolyte (2) disposed between and in ionic communication with the sensing electrode and the reference electrode (Figures 1 and 3).

Haefele does not *mention* that the ammonia selective sensing electrode comprises the *reaction product* of a main material selected from Applicants' list of main materials and an electrically conducing material selected from Applicants' list of electrically conducting materials. However, this is a product-by-process limitation that, barring a contrary showing, such as a material difference between the product of the

stated reaction and the ammonia selective sensing electrode composition of Haefele, is met by Haefele because Haefele discloses an ammonia selective sensing electrode comprising PtV_2O_5, $PtTiO_2$, or $PtTiO_2V_2O_5$. See Table 1 in column 6; col. 6:47-53; and col.12:7-41.

Addressing claims 2-3, claim 2 is construed as product-by-process limitation that only specifies a reagent. Since Haefele discloses PtV_2O_5 or V_2O_5 in an ammonia electrode (Table 1 in column 6) and thus meets the product limitation of claim 3 the product-by-process limitation of claim 2 is inherently also met.

Addressing claim 16, Haefele discloses a process for monitoring the concentration of ammonia gas in a gas stream, the process comprising

contacting a sensor with a gas stream (col. 12:7-41), the sensor comprising a reference electrode (13), an ammonia selective sensing electrode (7), and an electrolyte (2) disposed therebetween; and generating a voltage signal associated with the ammonia concentration (Figures 15-17).

Haefele does not *mention* that the ammonia selective sensing electrode comprises the *reaction product* of a main material selected from Applicants' list of main materials and an electrically conducing material selected from Applicants' list of electrically conducting materials. However, this is a product-by-process limitation (claim 16 is a process of using a product, not a process of making a product) that, barring a contrary showing, such as a material difference between the product of the stated

reaction and the ammonia selective sensing electrode composition of Haefele, is met by Haefele because Haefele discloses an ammonia selective sensing electrode comprising PtV_2O_5, $PtTiO_2$, or $PtTiO_2V_2O_5$. See Table 1 in column 6; col. 6:47-53; and col.12:7-41.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1, 2, 4-10, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitanoya et al. (Us 2003/0062264 A1) ("Kitanoya") in view of Williams (WO 00/17106) or Peschke et al. (WO 95/09361 A1) ("Peschke").

Addressing claim 1, Kitanoya discloses an ammonia gas sensor (abstract), comprising

a reference electrode (20);

an ammonia selective sensing electrode (40); and

an electrolyte (30) disposed between and in ionic communication with the sensing electrode and the reference electrode (Figure 1).

Kitanoya does not *mention* that the ammonia selective sensing electrode comprises the *reaction product* of a main material selected from Applicants' list of main materials and an electrically conducing material selected from Applicants' list of electrically conducting materials. Williams discloses a composition for an ammonia selective sensing electrode having "the formula $(MWO_4)_x(ZO_2)_{1-x}$, where M is selected from Mg, Mn, Fe, Co, Ni, and Cu and/or Zn, and Z is selected from Sn or Ti, where

0<x<1 are wolframite-based solid solutions which find utility as solid-state gas sensors for sensing carbon-monoxide, ammonia, methane. [emphasis added]" See the abstract. Peschke discloses a composition for an ammonia selective sensing electrode containing $AlVO_4$ or $FeVO_4$. Although neither Williams nor Peschke *mention* that the ammonia selective sensing electrode comprises the *reaction product* of a main material selected from Applicants' list of main materials and an electrically conducing material selected from Applicants' list of electrically conducting materials, this is a product-by-process limitation that, barring a contrary showing, such as a material difference between the product of the stated reaction and the ammonia selective sensing electrode compositions of Williams or Peschke, is met by Williams or Peschke. It would have been obvious to one with ordinary skill in the art at the time of the invention to use the composition of Williams or Peschke in the invention of Kitanoya because Williams and Peschke have found their composition particularly useful for sensing ammonia. See the abstract and page 5:12-14 in Williams and the abstract in Peschke. Peschke notes, for example, "The sensitivity to NO or NH_3 of a vanadate layer produced by a special sputtering process is higher several orders of magnitude than the transverse sensitivity to oxygen and hydrogen. The detector is not sensitive to methane, carbon monoxide and carbon dioxide. No masking effect occur, i.e. the sensitivity to NO and NH_3 of the detector is not affected by the presence of other gases." See the abstract. More broadly, it would have been obvious to one with ordinary skill in the art to optimize the sensor by selecting from known electrode compositions one that has the desired sensitivity or selectivity to the analyte of interest.

Addressing claim 2, Williams discloses at least Cu and Mg. See the abstract. Again, the choice of ammonia selective electrode compostion from known ammonia selective electrode composition is just a matter of optimizing the sensor. Although not needed to meet the claim since Applicants list Cu and Mg, Applicants should note that claim2 does not actually require magnesium oxide or copper oxide in the final product of the reaction of claim 1. See in Applicants' specification page 6:parpgh [0023], lines 4-5.

Addressing claims 4-6 and 9, M in the formula $(MWO_4)_x(ZO_2)_{1-x}$ corresponds to the electrically conducting material of claim 1. Based on the stochiometry of the formula the claimed ranges are within the scope or overlapped by Williams. For example, if x = 0.5 then the atomic percent M (Cu or Mg) is 11 at% (0,5 pts M, O.5 pts W, 2.0 pts O, 2.5 pts Z, and 1.0 pts O). If x = 0.3 then M is 4.1 at%. Note that electrically conductive material and the chemically stabilizing dopant can both be magnesium. Its use in the sensing electrode composition does not change its identity. Magnesium is magnesium.

Addressing claims 7 and 8, Williams discloses that the composition of the sensing electrode may include magnesium. See the abstract. For claim 8 note that whether the dopant "replaces" a portion of the main material in the sensing electrodes is a product-by-process limitation that does not further compositionally differentiate the sensing electrode composition of Williams from that of claimed. So long as the dopant Is present in the sensing electrode of Williams the limitations are met.

Addressing claim 10, let x=0.1 in the formula $(MWO_4)_x(ZO_2)_{1-x}$.

Addressing claim 16, Kitanoya discloses a process for monitoring the concentration of ammonia gas in a gas stream, the process comprising

contacting a sensor with a gas stream (paragraph [0043]), the sensor comprising a reference electrode (20), an ammonia selective sensing electrode (40), and an electrolyte (30) disposed therebetween; and generating a voltage signal associated with the ammonia concentration (Figure 2).

Kitanoya does not *mention* that the ammonia selective sensing electrode comprises the *reaction product* of a main material selected from Applicants' list of main materials and an electrically conducing material selected from Applicants' list of electrically conducting materials. Williams discloses a composition for an ammonia selective sensing electrode having "the formula $(MWO_4)_x(ZO_2)_{1-x}$, where M is selected from Mg, Mn, Fe, Co, Ni, and Cu and/or Zn, and Z is selected from Sn or Ti, where $0<x<1$ are wolframite-based solid solutions which find utility as solid-state gas sensors for sensing carbon-monoxide, ammonia, methane. [emphasis added]" See the abstract. Peschke discloses a composition for an ammonia selective sensing electrode containing $AlVO_4$ or $FeVO_4$. Although neither Williams nor Peschke *mention* that the ammonia selective sensing electrode comprises the *reaction product* of a main material selected from Applicants' list of main materials and an electrically conducing material selected from Applicants' list of electrically conducting materials, this is a product-by-

process limitation (claim 16 is a process of using a product, not a process of making a product) that, barring a contrary showing, such as a material difference between the product of the stated reaction and the ammonia selective sensing electrode compositions of Williams or Peschke, is met by Williams or Peschke. It would have been obvious to one with ordinary skill in the art at the time of the invention to use the composition of Williams or Peschke in the invention of Kitanoya because Williams and Peschke have found their composition particularly useful for sensing ammonia. See the abstract and page 5:12-14 in Williams and the abstract in Peschke. Peschke notes, for example, "The sensitivity to NO or NH_3 of a vanadate layer produced by a special sputtering process is higher several orders of magnitude than the transverse sensitivity to oxygen and hydrogen. The detector is not sensitive to methane, carbon monoxide and carbon dioxide. No masking effect occur, i.e. the sensitivity to NO and NH_3 of the detector is not affected by the presence of other gases." See the abstract. More broadly, it would have been obvious to one with ordinary skill in the art to optimize the sensor by selecting from known electrode compositions one that has the desired sensitivity or selectivity to the analyte of interest.

7. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haefele et al. (US 4,985,126) ("Haefele").

Haefele discloses an ammonia gas sensor (abstract and claims 7 and 9), comprising

a reference electrode (13);

an ammonia selective sensing electrode (7); and

an electrolyte (2) disposed between and in ionic communication with the sensing electrode and the reference electrode (Figures 1 and 3).

Haefele does not *mention* that the ammonia selective sensing electrode comprises the *reaction product* of a main material selected from Applicants' list of main materials and an electrically conducing material selected from Applicants' list of electrically conducting materials. However, this is a product-by-process limitation that, barring a contrary showing, such as a material difference between the product of the stated reaction and the ammonia selective sensing electrode composition of Haefele, is met by Haefele because Haefele discloses an ammonia selective sensing electrode comprising PtV_2O_5, $PtTiO_2$, or $PtTiO_2V_2O_5$. See Table 1 in column 6; col. 6:47-53; and col.12:7-41. claim 2 is construed as product-by-process limitation that only specifies a reagent. Since Haefele discloses PtV_2O_5 or V_2O_5 in an ammonia electrode (Table 1 in column 6) and thus meets the product limitation of claim 3 the product-by-process limitation of claim 2 is inherently also met.

Haefele does not specify an atomic percent range for the electrically conducting material based on the whole sensing electrode, however, barring evidence to the contrary, such as unexpected results, a range as claimed by Applicants is just optimization. One with ordinary skill in the art would know that Pt in PtV_2O_5, at least in

part, provides good conductivity to the sensing electrode and V_2O_5 imparts sensitivity for ammonia. Thus, the ratio of Pt to V_2O_5 in PtV_2O_5 is just a balance of conductivity and sensitivity for a reliable, accurate measurement signal.

Claim Objections

8. Claims 11 and 13 are objected to because of the following informalities:

a) Claim 11, line 2: between "dopant" and "zinc" the following should be inserted – selected from the group consisting of --; and

b) Claim 13, line 16: between "dopant" and "zinc" the following should be inserted – selected from the group consisting of --;

Appropriate correction is required.

Allowable Subject Matter

9. Claims 13-15 are objected to (see Claim Objections above), but would be allowable upon correction.

10. Claims 11-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

11. The following is a statement of reasons for the indication of allowable subject matter:

a) Claim 11: the combination of limitations requires the sensing electrode to *further* comprise a diffusion-impeding dopant from the stated Markush group of elements or compounds (oxides). This dopant as discussed in the specification is actually part of the reaction product of claim 1. That is, it is part of a compound. See page 6 of the specification, penultimate line to the top of page 7.

b) Claim 12 depends from allowable claim 11;

c) Claim 13: the combination of limitations requires the sensing electrode to *also* comprise a diffusion-impeding dopant from the stated Markush group of elements or compounds (oxides). This dopant as discussed in the specification

is actually part of the compound formed as the reaction product of line 5 of the claim. See page 6 of the specification, penultimate line to the top of page 7; and

d) Claims 14 and 15 depend from allowable claim 13;

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX NOGUEROLA whose telephone number is (571) 272-1343. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NAM NGUYEN can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alex Noguerola
Primary Examiner
AU 1753
August 18, 2005